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EXAMINER

LISTVOYB, GREGORY

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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.



## DETAILED ACTION

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 25-34, 37, 39-48 rejected under 35 U.S.C. 103(a) as being unpatentable over Borner et al (WO02/40564, cited in IDS, in the present Office Action this document cited with equivalent US 20040024131) herein Borner in view of Adams et al (US 2473463, cited in the previous Office Action) and in further view of Michel et al (US 4271286)

Borner teaches a direct synthesis process for preparing etherified melamine resin condensates wherein

a) in the first step of the reaction, an etherified melamine resin precondensate is prepared in alcoholic solution (Methanol, see Example 1, meets the limitations of Claim 27 and Claim 28) with formaldehyde (meeting limitation of Claims 29 and 31) at temperature 20-100C (meeting the limitations of claim 34 and newly added claim 48);

b) in the first step (see Example 1), the concentration of the etherified melamine resin precondensate in alcoholic solution is increased, C4-C18 alcohols (C4 butanol, see Example 1);

Borner teaches re-concentration of the product after addition of 2L of methanol, which can be considered as a second vaporization step (see Example 1);

c) in a second step of the reaction, the increased-concentration melamine resin precondensate is reacted, using a mixer (extruder, see Example 1).

Regarding the new limitation claiming alcohol addition after a concentration increasing step, Borner teaches that on the first stage Methanol distilled off. On the second stage butanol is added (see Example 1).

Regarding claim 26, Borner teaches that after the second step of the reaction, the etherified melamine resin condensate is discharged and palletized (granulated) (see Example 2).

Regarding claims 29-30, Borner teaches a process, which takes place at pH of 6.5-9, preferably 7-8 (see line 0030).

Regarding claim 41-42, Borner teaches highly vented extruder (see Claim 9). Although Borner does not teach the details of the extruder, it would have been obvious to a person of ordinary skill in the art that it should have very effective vapor removal system, since harmful formaldehyde releases during the process.

Regarding Claim 43, Borner teaches addition of up to 60% of particulate additives (see line 0040).

Borner does not teach Molecular Weight of 500 to 50 000. However, the resulting resin is palletized, which suggests that its Molecular weight is at least 500.

Borner does not disclose any exact solid content after vaporization (i.e. before the extrusion). However, Borner teaches that the resin, obtained in stage (1) is both dried and procured in a double screw extruder at temperature between 160 and 185C (see Example 1, line 0046). the position is taken that the conditions above are sufficient to obtain dry resin, having 95-99% solids. In fact, boiling temperature of all ingredients is far below 160C (highest boiling ingredient is Butanol with boiling point of 118C).

Additionally, in Example 2 Borner discloses heating of the resin at 180C for 2 hours in a vacuum (see line 0049). Note that Specification of the Application examined discloses a heating of an etherified melamine at 90C in a vacuum, producing a resin with 96% solids. (see Inventive Example 4, line 0115).

Therefore, the position is taken that the amount of solids in Borner's reference is expected to be within the claimed range, since the reference uses stronger heating conditions compare to the Specification of the Application examined.

Note that Borner teaches addition of Butanol after neutralization step, which makes trans-esterification process improbable. Therefore, Borner polymer is not free from  $\text{NH-CH}_2\text{-O-CH}_2\text{-NH}$ , since methylol groups tend to react with each other.

The Borner's process has a disadvantage of releasing poisonous formaldehyde during the kneading process. In addition, product, having longer alcohol has better elasticity.

In summary, Borner does not teach the melamine resin condensates are free from hydroxymethyleneamino groups bonded to the triazine rings of the melamine resin condensate and from  $\text{-NH-CH}_2\text{-O-CH}_2\text{-NH-}$  groups linking triazine ring.

Adams teaches a process for making a fully methylated melamine-formaldehyde composition, which obtained by trans-etherification with butanol (see Examples, particularly Example 3), where first step represents methylolation with a subsequent etherification. The above process is well known in the industry. It allows preventing additional polymerization of formaldehyde to paraformaldehyde. Adams teaches etherification process at pH 5.5-6.5 (see Column 4, line 65, meeting the limitations of Claim 30 and 31) at 86-91°C (see Column 6, line 15, meeting the limitations of claim 34) and melamine –formaldehyde ratio of 1:3 (see Example 3, meeting the limitation of Claim 35). Adams teaches both simultaneous and sequential processes (see

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Examples). Adams teaches that increased concentration of the condensate after vaporization is 10-85%.

Regarding Claim 33, Adams discloses a process at the presence of ion-exchange resins (see Example 3).

Regarding Claim 37, Adams teaches two step distillation (see Examples).

In reference to Claim 40, Adams teaches addition of acid –modified butanol (see Examples).

Therefore, it would have been obvious to a person of ordinary skills in the art to modify Borner's process with Adams, since it will lead to a safer process (since no poisonous gas releases during the extrusion) and create a product with better mechanical properties (i.e. elasticity). In addition, Adams's process prevents forming a by-product (polyparaformaldehyde), which can deteriorate the performance of the target composition.

Borner and Adams do not teach a limitation of claim 25, which claims solid content of etherified precondensate in alcoholic solution within the range of 65-85% wt.

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Michel teaches a process for preparation of methyloltriazines etherified with alkanols.

In particular, he teaches reaction of melamine, formaldehyde and methanol with following evaporation step, where solid content of the reaction product is 75% wt (see Example 1).

Michel's process allows achieving high storage stability of the resulting precondensate along with economical advantages. Solid content of Michel's product is low enough for undesirable crystallization of the precondensate and high enough for handling of the solution (i.e. transportation, piping, etc.) (see Column 1, line 65).

In addition, this step is advantageous from economical reason. Firstly, having highly concentrated melamine resin requires lower apparatus volume, needed for further pre-concentration before the extrusion step. Secondly lower amount of material is much easier to handle. Thirdly, evaporating lower amount of solvent require less demanding drying equipment. For instance, composition, having 75-85% of resin content represents solid mass, which requires only a heater with metal pane with venting, whereas liquid composition requires vacuumed reactor with stirrer.

Therefore, it would have been obvious to a person of ordinary skills in the art to pre-concentrate melamine resin to 65-85%, achieving solid state material in order to provide more economical and technologically sound process

Claim 38 rejected under 35 U.S.C. 103(a) as being unpatentable over Borner in view of Adams and Michel as applied to claims 25-34, 37, 39-48 above, and further in view of Horacek (US 5206066) herein Horacek.

Borner teaches a direct synthesis process for preparing etherified melamine resin condensates wherein

a) in the first step of the reaction, an etherified melamine resin precondensate is prepared in alcoholic solution (Methanol, see Example 1, meets the limitations of Claim 27 and Claim 28) with formaldehyde (meeting limitation of Claim 29),

b) in at least one vaporization step (see Example 1), the concentration of the etherified melamine resin precondensate in alcoholic solution is increased, C4-C18 alcohols (C4 butanol, see Example 1).

c) in a second step of the reaction, the increased-concentration melamine resin precondensate is reacted, using a mixer (extruder, see Example 1).

Adams teaches a process for making a fully methylated melamine-formaldehyde composition, which obtained by trans-etherification with butanol (see Examples, particularly Example 3), where first step represents methylolation with a subsequent etherification.

Michel teaches a process for preparation of methyloltriazines etherified with alkanols, where he teaches reaction of melamine, formaldehyde and methanol with

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following evaporation step, where solid content of the reaction product is 75% wt (see Example 1).

Borner, Adams and Michel do not teach diol as etherification agent.

Horacek discloses a melamine-formaldehyde resin, modified with diol (see Abstract and Column 2, line 30), such as 1,4 butane diol.

The advantage of Horacek resin is that it exhibits low shrinkage during curing and good mechanical properties (high flexibility) (see Column1, line 30).

Therefore, it would have been obvious to a person of ordinary skills in the art to use diols in Borner/Adams processes in order to achieve low shrinkage during curing and high flexibility.

### ***Response to Arguments***

Applicant's arguments filed 5/27/2009 have been fully considered but they are not persuasive.

Applicant submits that "none of the above-cited documents, taken alone or combined as set forth in the Office Action, suggests or discloses:

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(1) a two step vaporization process for concentrating the etherified melamine resin precondensate up to a concentration of 99 wt%, or

(2) the addition of a diol for transesterification after the concentration-increase process”.

Examiner disagrees. Regarding (1), Borner does not disclose any exact solid content after vaporization (i.e. before the extrusion). However, Borner teaches that the resin, obtained in stage (1) is both dried and procured in a double screw extruder at temperature between 160 and 185C (see Example 1, line 0046). the position is taken that the conditions above are sufficient to obtain dry resin, having 95-99% solids. In fact, boiling temperature of all ingredients is far below 160C (highest boiling ingredient is Butanol with boiling point of 118C).

Additionally, in Example 2 Borner discloses heating of the resin at 180C for 2 hours in a vacuum (see line 0049). Note that Specification of the Application examined discloses a heating of an etherified melamine at 90C in a vacuum, producing a resin with 96% solids. (see Inventive Example 4, line 0115).

Therefore, the position is taken that the amount of solids in Borner's reference is expected to be within the claimed range, since the reference uses stronger heating conditions compare to the Specification of the Application examined.

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Regarding the new limitation claiming alcohol addition after a concentration increasing step (2), Borner teaches that on the first stage Methanol distilled off. On the second stage butanol is added (see Example 1).

Regarding Horacek, Applicant argues that the reference teaches high formaldehyde content, does not disclose two vaporization steps and order of alcohol addition.

Examiner disagrees. All the above steps disclosed in the primary reference (Borner), Adams and Michel. Horacek applies as a ground for rejection only for the purposes to teach diol as an etherifying agent.

### ***Conclusion***

**THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of

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the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to GREGORY LISTVOYB whose telephone number is (571)272-6105. The examiner can normally be reached on 10am-7pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, James Seidleck can be reached on (571) 272-1078. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/James J. Seidleck/

Supervisory Patent Examiner, Art Unit 1796

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